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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,452	11/16/2001	Satoshi Aoyagi	SIW-022RCE2	5172
959 7590 02/12/2009 LAHIVE & COCKFIELD, LLP FLOOR 30, SUITE 3000 ONE POST OFFICE SQUARE BOSTON, MA 02109			EXAMINER WALKER, KEITH D	
			ART UNIT 1795	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/988,452

Applicant(s)

AOYAGI ET AL.

Examiner

KEITH WALKER

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1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 and 36 is/are pending in the application.
- 4a) Of the above claim(s) 1-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Claims 1-34 & 36 are pending in the application with claims 1-34 withdrawn from consideration.

Claim 36 is pending examination and rejected for the reasons below.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claim 36 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the variation in electrical load increasing, does not reasonably provide enablement for the variation in electrical load decreasing. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The breadth of the claims is broader than the description provided. The nature of the invention is directed towards preventing the fuel cell from developing a shortage of gas as the load on the fuel cell increases. The specification does not discuss when the variation is a decrease in the load. The instant disclosure does not provide any direction or working examples of operating the claimed fuel cell in the claimed manner when the variation of the fuel cell is a downward variation.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "in advance of a variation in an electrical load" is indefinite because it doesn't distinctly disclose a time for 'in advance'. While a broad claim is not in itself indefinite, in light of the claim as a whole, this limitation fails to particularly point out a distinct and understandable time for the operational conditions of the controller of the fuel cell. Every moment up until the fuel cell is either turned off or operating at full capacity, is a time "in advance of a variation in an electrical load". So in light of the fuel cell always being "in advance of a variation in an electrical load" and if the excess amount of fuel relating to the anticipated increased current is always added to the fuel cell, then isn't from the moment the fuel cell is turned on, the fuel cell immediately ramps to maximum capacity?

3. Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The timeline for the method of operating the fuel cell is awkward and unclear and as such is not distinctly claimed. The controller supplies excess reactant "in advance of a variation in an electrical load". (Emphasis added) by "determining an expected output current after the variation in the electrical load". Then after some calculations involving the voltage that is determined from the expected

current after the variation in the electrical load, the excess amount of fuel is supplied to the fuel cell "in advance of the variation of the electrical load". (Emphasis added) It is unclear how the voltage is determined based on a synthetic output after the variation in load but the excess reactant is supplied to the fuel cell before the variation in the load, which is the first action required to start the process of determining the voltage.

Claim Interpretation

In light of the 112 rejection above, the claimed invention is being interpreted as best as can be ascertained by the instant specification without incorporating limitations of the specification into the claims. Therefore, the claim is interpreted to mean an excess amount of reactant is supplied to the fuel cell before the load changes based on a look-up table and based on the assumption that the load will increase thereby increasing a power demand on the fuel cell. Regarding the "assumption" part, this is the explanation used by applicant on the last paragraph of page 16 in the instant specification, "When a current in a variation of the current load is assumed to vary...". Furthermore, the excess reactant is interpreted as the amount of reactant needed to meet the new assumed load requirement above the reactant amount that would be required at constant load. Such that if the load does increase to the new assumed amount, that volume of reactant considered excess is reduced as the load uses the power produced by the fuel cell. Once the new assumed load is met no excess reactant exists since the fuel cell is producing the assumed power demand.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. As best understood, claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,964,309 (Kimura) in view of JP 08-214452 (Takeshi).

Kimura teaches a power supply system with a stack of fuel cells connected to a storage battery in parallel. The reacting gases are supplied to the fuel cell in amounts based on the estimated output of the fuel cell, the charge of the storage battery, and the amount of power required by a load. The feed amount includes the amount required for providing the required power to the load and a feed adjustment based on the estimation charge-discharge state of the storage battery (2:50-60). The estimation is equivalent to the claimed 'determination of the expected load' and the battery and load discussed by Kimura is equivalent to the claimed 'load'. The storage battery may be charged by the fuel cell and/or supply energy to the load in addition to that supplied by the fuel cell (Figs. 1 & 7, Abstract). The fuel cell system determines the amount of reactants needed to supply the fuel cell based on the charge-discharge state of the battery. Thus, if the battery is in short supply of power, then a larger supply of reactants to the fuel cell is needed to overcome the shortage of reserve power in the battery (2:45-3:31). Reactant gases are supplied to the fuel cell based on target values of the motors and machinery used with an electric vehicle (8:15-41).

Kimura teaches the supplying reactants to the fuel cell based on the charge-discharge estimation of the battery and the estimation of the amount of load required (3:45-60). Kimura also teaches using this estimation process to prevent the shortage of reactant gas supplied to the fuel cell so a voltage drop does not occur (3:1-13). Two conclusions are ascertained by the teachings of Kimura. First, if the load requirements are over estimated then an excess amount of fuel is supplied to the fuel cell and the instant claims are met. Second, since Kimura teaches supplying reactants to the fuel cell based on estimated future load requirements and that a shortage of reactants creates an undesirable effect of a voltage drop, it would be obvious to one skilled in the art to provide an excess amount of reactant to the fuel cell to ensure a voltage drop does not occur and thereby always operating the fuel cell in a manner that meets the load's requirements.

However, Kimura fails to teach a capacitor that is directly connected to the fuel cell.

Takeshi teaches a hybrid power system in which batteries or electric double capacitors are charged by a fuel cell and provide additional power to a load ([0002-0004], [0010]). The current-voltage characteristics of the fuel cell and of the energy storage device (whether it be a battery or capacitor) inherently depend on their respective internal resistances (Ohm's Law: $V=IR$). The system evaluates the internal resistance of the capacitor and increases the reactants of the fuel cell to overcome the resistance of the capacitor ([0018-0019]). The capacitor is used to supply a temporary

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supplemental amount of power to the load due to an increase in the power requirements (Abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to would have recognized the ability of an electric double capacitor in the hybrid system as taught by Takeshi to perform the same function as the storage battery in the fuel cell power supply system as taught by Kimura because batteries and capacitors are equivalent means to provide additional power to a load and to be charged by fuel cells.

Response to Arguments

Applicant's arguments with respect to claim 36 have been considered but are moot in view of the new ground(s) of rejection as required by amendment.

Applicant alleges the gas shortage state in Kimura is different than the instant claim. However, the fact that Kimura teaches examples of what encompasses the load does not detract from the fact that Kimura teaches preventing a gas shortage in advance of the load varying.

Applicant argues that Kimura does not teach the predetermined excessive rate. However, this is not a limitation presented in the claims.

Applicant alleges "the two conclusion reached by the Examiner in the Office Action are overreaching and fail to identify each and every element recited in claim 36." However, applicant fails to point out which elements are missing. Regarding the overreaching conclusions, the *prima facie* statements are clearly laid out in the

rejections and are supported with scientific reasoning and the teachings of Kimura and Takeshi. The excess fuel is supplied by controlling the flow of fuel to the fuel cells as recited by Kimura (8:1-40). The practice of the invention would be done so by the teachings of Kimura in view of Takeshi as stated in the rejection above. The motivation and reasoning statements are discussed above and have not been addressed by applicant.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH WALKER whose telephone number is (571)272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

K. Walker

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795